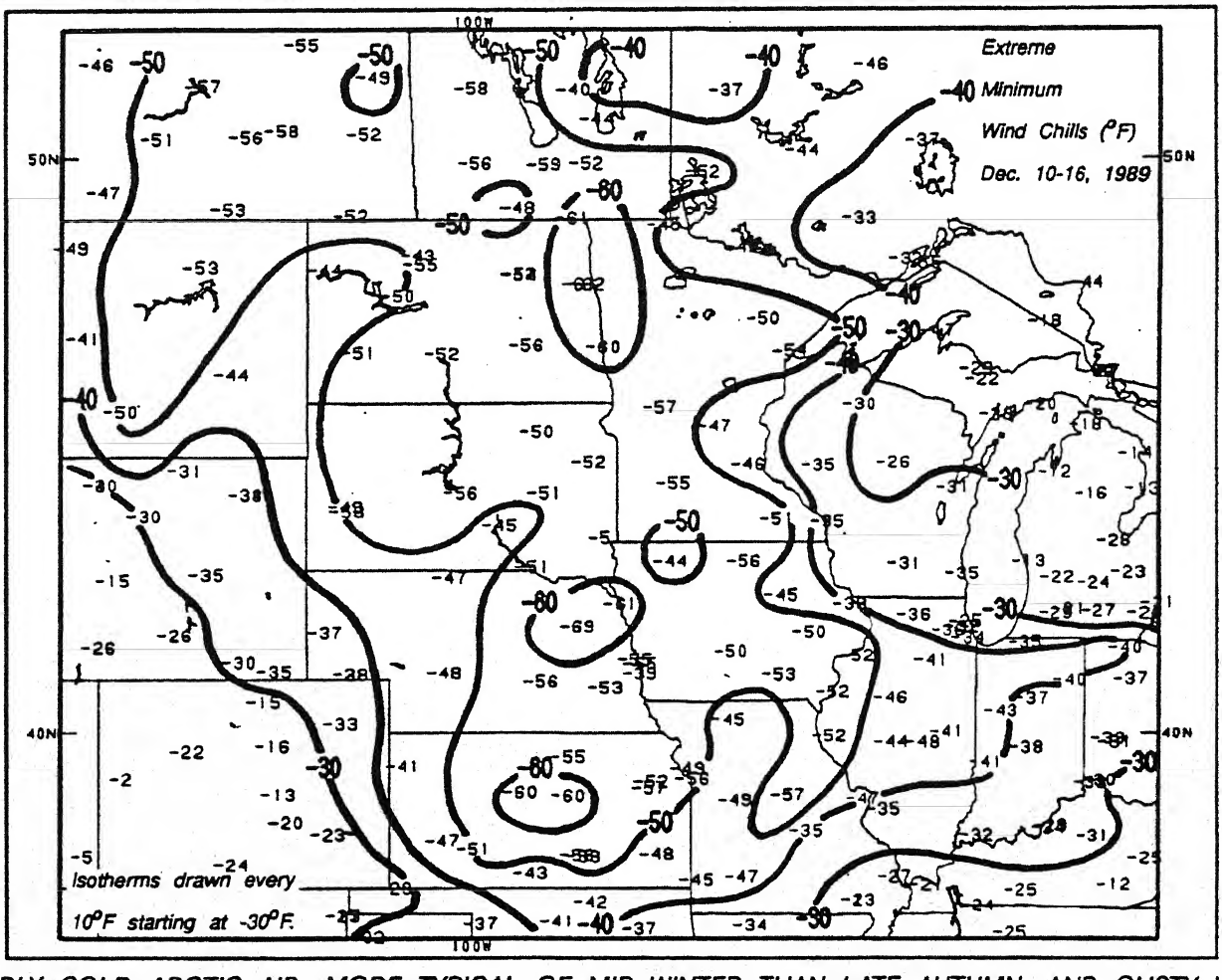
CLIMATE ANALYSIS CENTER

CONTAINS:
UPDATE ON SOUTHERN AFRICAN RAINY SEASON

WEEKLY CLIMATE BULLETIN

No. 89/50 **Washington, DC** **December 16, 1989**



BITTERLY COLD ARCTIC AIR, MORE TYPICAL OF MID-WINTER THAN LATE AUTUMN, AND GUSTY WINDS COMBINED TO PRODUCE EXTREMELY DANGEROUS WIND CHILLS (AS LOW AS -69°F) ACROSS THE NORTHERN AND CENTRAL PLAINS, MIDWEST, AND GREAT LAKES LAST WEEK. TEMPERATURES AVERAGED BETWEEN 15°F AND 25°F BELOW NORMAL, AND LOWS PLUNGED WELL BELOW 0°F (-29°F AT VALENTINE, NE) ACROSS THE ENTIRE NORTH-CENTRAL U. S. FARTHER EAST, NEW ENGLAND ENDURED ITS FOURTH CONSECUTIVE WEEK OF WELL BELOW NORMAL TEMPERATURES.

UNITED STATES DEPARTMENT OF COMMERCE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NATIONAL WEATHER SERVICE – NATIONAL METEOROLOGICAL CENTER

CLIMATE ANALYSIS CENTER

WEEKLY CLIMATE BULLETIN

This Bulletin is issued weekly by the Climate Analysis Center and is designed to indicate, in a brief concise format, current surface climatic conditions in the United States and around the world. The Bulletin contains:

- Highlights of major climatic events and anomalies.
- U.S. climatic conditions for the previous week.
- U.S. apparent temperatures (summer) or wind chill (winter).
- U.S. cooling degree days (summer) or heating degree days (winter).
- Global two-week temperature anomalies.
- Global four-week precipitation anomalies.
- Global monthly temperature and precipitation anomalies.
- Global three-month precipitation anomalies (once a month).
- Global twelve-month precipitation anomalies (every three months).
- Global three-month temperature anomalies for winter and summer seasons.
- Special climate summaries, explanations, etc. (as appropriate).

Most analyses contained in this Bulletin are based on preliminary, unchecked data received at the Climate Analysis Center via the Global Telecommunications System. Similar analyses based on final, checked data are likely to differ to some extent from those presented here.

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GLOBAL CLIMATE HIGHLIGHTS

MAJOR EVENTS AND ANOMALIES AS OF DECEMBER 16, 1989

1. *Eastern Canada and United States*:

ARCTIC COLD SURGES SOUTHWARD.

The bitterly cold temperatures which had been limited to the more northern reaches of the U.S. spread across all of the eastern half of the country. Temperatures averaged nearly 14°C below normal while blustery winds sent wind chills to –56°C. Dozens of daily low temperature records were shattered and a record minimum temperature for December (–23°C) was tied at Wichita, KS [7 weeks].

2. *Central Great Plains and Western Corn Belt:*

DRY CONDITIONS PERSIST.

Moisture supplies remained limited throughout Kansas, Missouri, and Nebraska where little to no precipitation (< 5 mm) fell. In these states, totals over the past 3 months are less than one–fifth of normal while adjacent areas of Oklahoma, Arkansas, Iowa, and Illinois have measured only 20 to 30% of normal for the period [13 weeks].

3. *Iberian Peninsula*:

WARM, WET PATTERN LINGERS.

While northern portions remained dry, the remainder of Spain and Portugal continued to accumulate significant rainfall with as much as 201 mm observed [6 weeks]. Above normal temperatures pushed across Spain and into southern France as a strengthening upper air ridge increased southerly flows. Averages peaked at 8°C above normal [9 weeks].

4. *Europe, Western U.S.S.R., and the Middle East*:

COLD AIR SHOVED EASTWARD.

The upper air ridge which brought anomalous warmth to the Iberian Peninsula also elevated temperatures throughout western Europe to near normal values. As a result, the unusually cold conditions were confined to eastern Europe and Turkey where departures approached –7°C [Ending at 4 weeks].

5. *South Africa*:

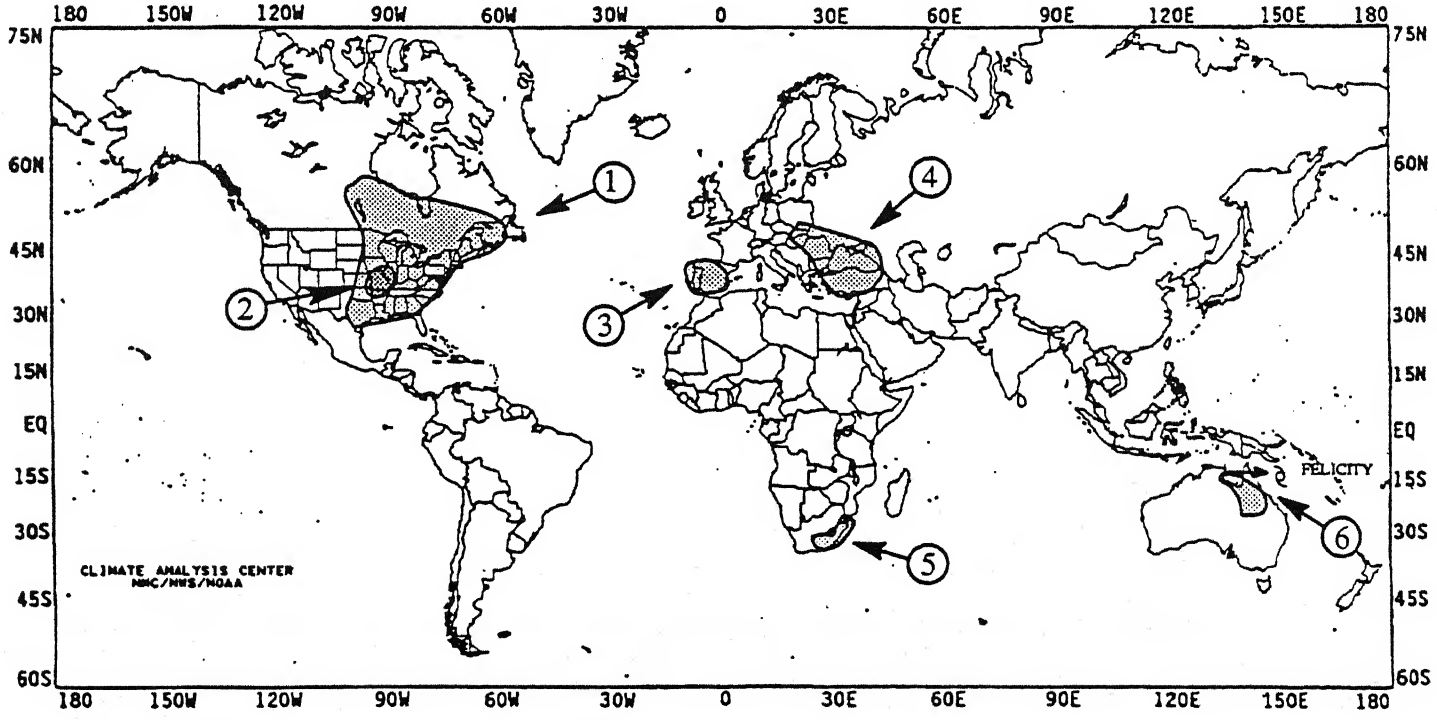
EXCESSIVE MOISTURE DIMINISHES.

Generally less than 30 mm fell, with the exception of extreme eastern South Africa where 87 mm was recorded. While the aforementioned region has remained anomalously wet, moisture across the remainder of the country has returned to more normal levels [Ended at 6 weeks].

6. *Northeastern Australia*:

TROPICAL STORM CROSSES QUEENSLAND.

The remnants of Tropical Storm Felicity continued the pattern of excessive rainfall as accumulations reached 124 mm. The storm also dumped approximately 150 mm along the coast of the Northern Territory [7 weeks].



EXPLANATION

TEXT: Approximate duration of anomalies is in brackets. Precipitation amounts and temperature departures are this week's values.

MAP: Approximate locations of major anomalies and episodic events are shown. See other maps in this Bulletin for current two week temperature anomalies, four week precipitation anomalies, long–term anomalies, and other details.

UNITED STATES WEEKLY CLIMATE HIGHLIGHTS

FOR THE WEEK OF DECEMBER 10 THROUGH DECEMBER 16, 1989

Bitterly cold Arctic air held the eastern two-thirds of the nation in a tight grip while unseasonably mild weather spread across Alaska. Generally dry weather accompanied the polar air mass that was entrenched across most of the U.S. with two exceptions.

Early in the week, an Arctic cold front dropped southward from Canada, passing through the Plains, Great Lakes, and Midwest before reinforcing cold air across the East by late Tuesday. Small waves of low pressure formed along the front as it moved across the central Rockies and Plains, generating spotty areas of light to moderate snow across those regions. Parts of Colorado, Wyoming and Iowa received more than five inches of snow before exceedingly cold and dry air moved in. Some beneficial light snows also fell across parched sections of the Great Plains.

A major winter storm began to develop as the front dropped into the Gulf of Mexico on Monday night. One of the small waves interacted with the sharp temperature contrast between the Arctic cold and the warm Gulf waters. The ensuing system quickly developed along the northern Gulf Coast and moved slowly across Georgia and northeastward into the open Atlantic Tuesday evening. Moderate to heavy thundershowers accompanied the storm as it trekked across the Southeast while 5 to 12 inches of snow blanketed much of the southern and central Appalachians and the mid-Atlantic. Parts of the southeastern mid-Atlantic recorded over a foot of snow as precipitation lingered well to the west of the storm's center.

Later in the week, a deep winter storm began to organize as it dropped southward out of Saskatchewan, scattering light snow from the Rockies to the Great Lakes. The system rapidly intensified in the eastern Ohio Valley then moved east-northeastward across Pennsylvania and coastal New England. More than half a foot of snow buried parts of eastern Ohio and Pennsylvania while some stations in southern interior New England reported nearly a foot. South of this system, warm air briefly flowed up the southern Atlantic Seaboard, but wintry weather quickly re-established itself as a strong cold front trailing from the system pushed across the Southeast. A short-lived period of heavy snow accompanied the cold front across the central Appalachians and mid-Atlantic. Thunder occurred in conjunction with heavy snow showers across West Virginia while parts of the mid-Atlantic received two or three inches of snow in just one or two hours.

A strong reinforcing blast of Arctic air followed both storm systems. Strong winds combined with the Arctic air to induce wind chill readings as low as -69°F below zero in Nebraska (see Front Cover). The same combination of wind and cold air interacted with the relatively warm Great Lakes to generate several rounds of heavy lake-effect snows in the snow belt regions. Parts of upper Michigan and western portions of the Northeast were buried under nearly two feet of snow during the week.

Farther west, Arctic air evaded western sections of the Rockies, the Intermountain region and the Far West, but temperatures still remained cold. Precipitation was also lacking across the West as an upper level ridge steered all but a few light showers well north of the Pacific Northwest. Meanwhile, mild air, relatively scarce in the lower 48 states, abounded in Alaska where huge positive departures from normal allowed Anchorage to experience a warmer week than Little Rock, AR and Huntsville, AL. Only the extreme northern fringes of the state endured near normal temperatures and less than abundant precipitation. Meanwhile, unusually cool and dry weather dominated Hawaii.

According to the River Forecast Centers, heavy precipitation (in excess of two inches) was confined the southern tier of Alaska, parts of north-central Wyoming, and scattered locations across the Southeast. Very heavy precipitation was reported in south-central Alaska where some stations observed over 11 inches (see Table 1). Lesser heavy amounts affected the Aleutians and the Panhandle.

Across the conterminous 48 states, heavy precipitation was sparse. Locally heavy snows (up to 3.6 inches of liquid) occurred in the east-central Rockies and eastern High Plains while midweek thunderstorms generated between one and three inches of rain across the Southeast. Elsewhere, light to moderate frozen precipitation created occasional travel problems in the northeastern quarter of the nation as well as in northern reaches of the lower Mississippi Valley and Southeast. Beneficial light precipitation was observed across the central Plains, where excessively dry weather has eased slightly during the past two weeks.

Unfortunately, very dry weather persisted in the western quarter of the nation. December normally ushers in abundant rainfall across the Pacific Northwest, with lesser amounts falling in the Southwest and Intermountain West. For the fourth consecutive year, rainfall has been unseasonably light across most of the region. Timely rainfall is needed to avoid another dry year across much of the West, particularly in California..

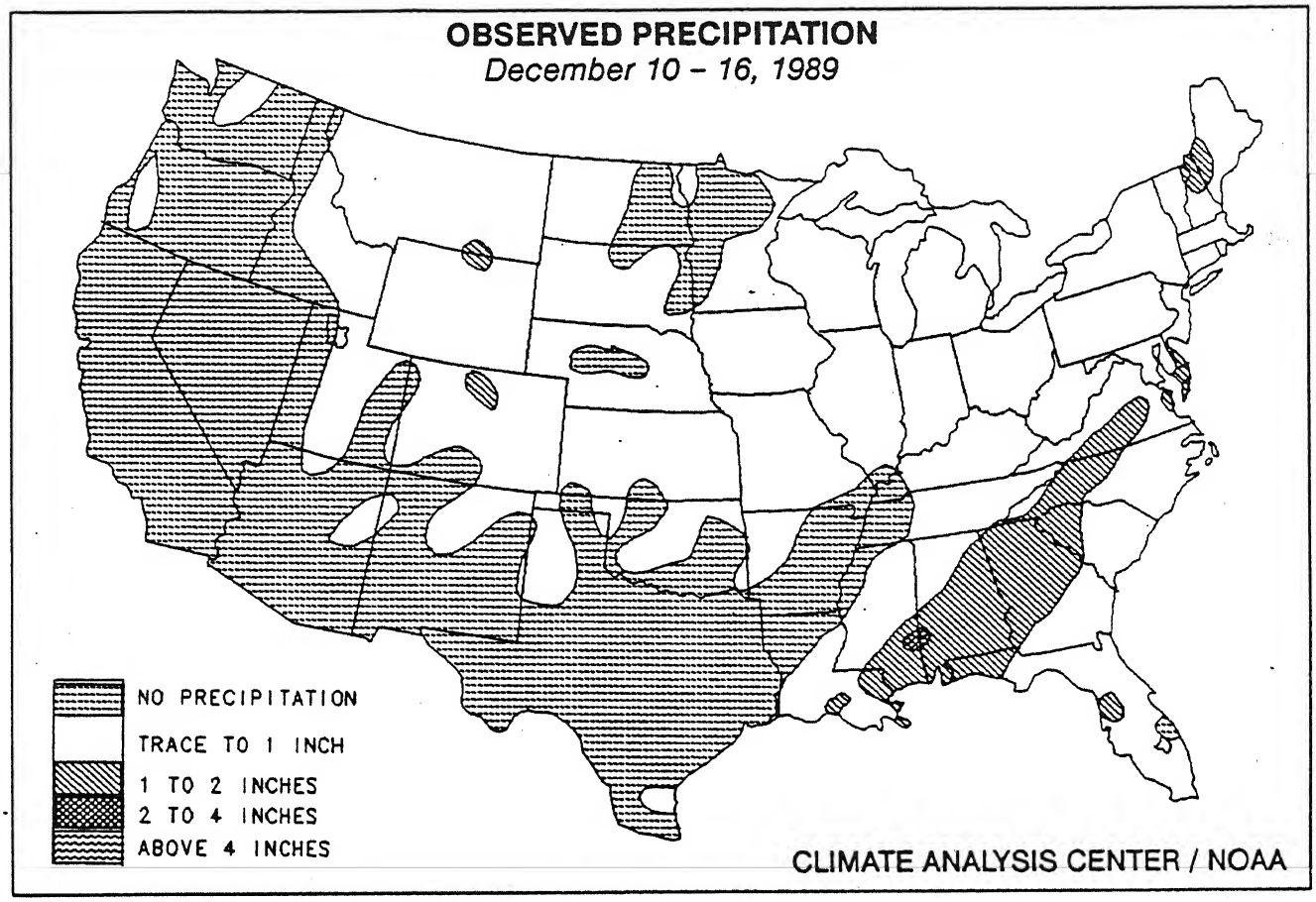
New England weathered a fourth consecutive frigid week as departures were between -9°F and -18°F; however, the center of the polar air became entrenched across the northern Plains and lower two-thirds of the Missouri Valley where temperatures averaged between 20°F and 26°F below normal (see Table 3). Several dozen daily record lows were broken during the week, and many stations in the northern Plains and northern New England spent entire days below 0°F. Subzero readings occurred as far south as Arkansas while only the West Coast, desert Southwest and Florida Peninsula enjoyed above-freezing temperatures during the entire week.

Well below normal temperatures affected most of the contiguous U.S. and Hawaii, with departures in excess of -5°F reported across the eastern three-quarters of the lower 48 states. In the Far West, most stations observed cool weather, with above normal weekly average temperatures confined to small portions of the Intermountain West as well as all of Alaska (see Table 2).

The only portion of the U.S. with milder than usual weather was Alaska. Departures of more than +10°F were recorded throughout the southern three-fourths of the state, with many southern and central stations reporting departures of +27°F to +34°F. Temperatures surged into the forties across much of the state while only the extreme northern coast experienced conditions colder than the northern Plains.

TABLE 1. Selected stations with 2.00 or more inches of precipitation for the week.

STATION	TOTAL (INCHES)	STATION	TOTAL (INCHES)
YAKUTAT, AK	11.07	SITKA, AK	3.02
CORDOVA/MILE 13, AK	6.59	COLD BAY, AK	2.01
VALDEZ, AK	6.46	ANNETTE ISLAND, AK	2.00


OBSERVED PRECIPITATION
December 10 – 16, 1989
NO PRECIPITATION
TRACE TO 1 INCH
1 TO 2 INCHES
2 TO 4 INCHES
ABOVE 4 INCHES
CLIMATE ANALYSIS CENTER / NOAA

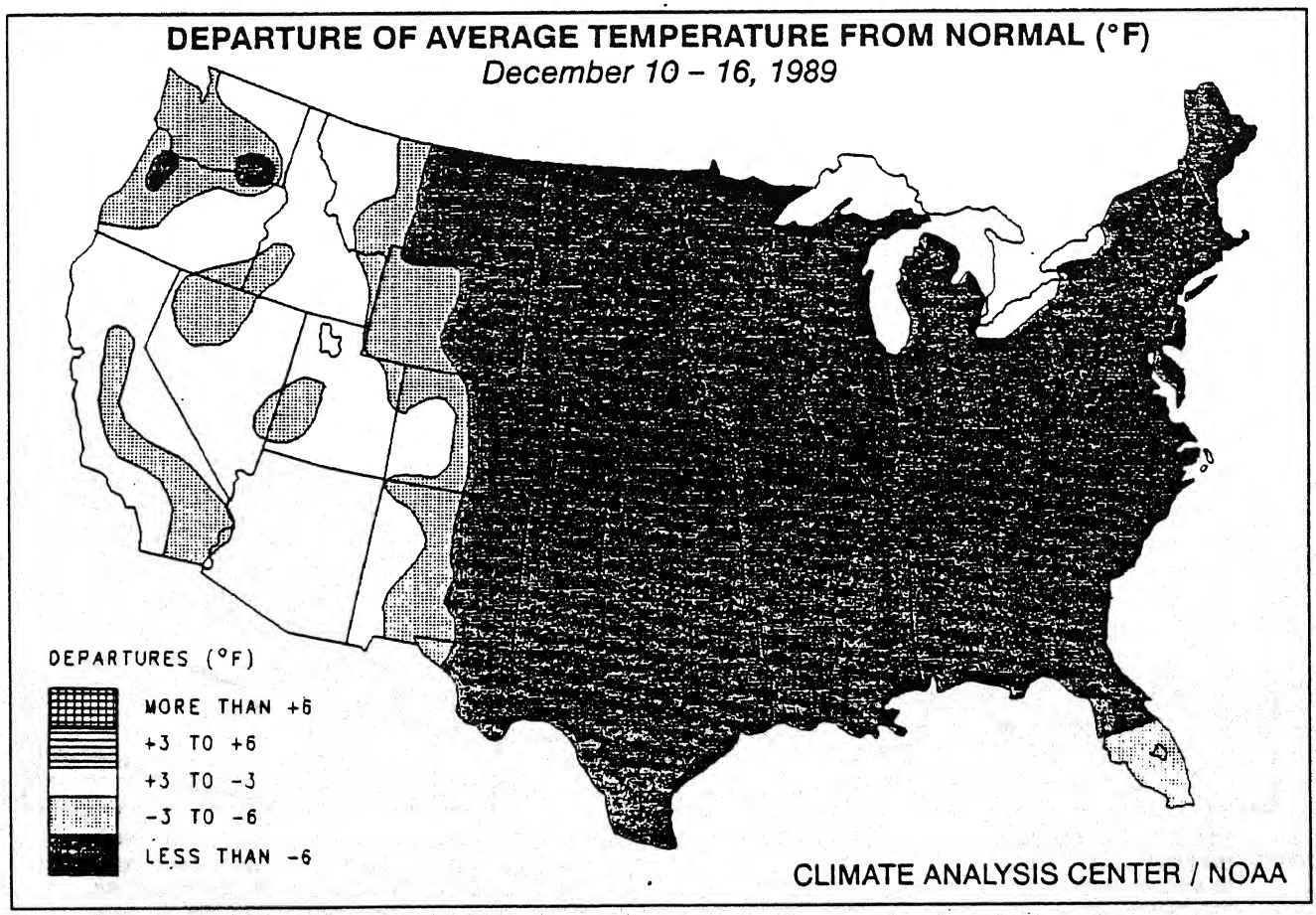

DEPARTURE OF AVERAGE TEMPERATURE FROM NORMAL (°F)
December 10 – 16, 1989
DEPARTURES (°F)
MORE THAN +6
+3 TO +6
+3 TO -3
-3 TO -6
LESS THAN -6
CLIMATE ANALYSIS CENTER / NOAA

TABLE 2. Selected stations with temperatures averaging 10.0°F or more ABOVE normal for the week.

STATION	DEPARTURE (°F)	AVERAGE (°F)	STATION	DEPARTURE (°F)	AVERAGE (°F)
MCGRATH, AK	+34.4	25.6	NORTHWAY, AK	+23.4	6.8
ANIAK, AK	+34.0	34.0	ILIAMNA, AK	+22.9	36.6
KOTZEBUE, AK	+28.5	24.6	NOME, AK	+21.5	26.0
FAIRBANKS, AK	+28.1	18.5	TALKEETNA, AK	+21.0	30.1
BIG DELTA, AK	+28.0	24.0	KENAI, AK	+20.8	33.1
GULKANA, AK	+27.7	22.3	ANCHORAGE, AK	+19.5	33.7
UNALAKLEET, AK	+27.1	28.8	HOMER, AK	+16.4	38.7
BETHEL, AK	+26.7	31.9	VALDEZ, AK	+12.5	31.9
FORT YUKON, AK	+26.6	7.6	CORDOVA/MILE 13, AK	+11.3	35.2
BETTLES, AK	+24.9	16.9	JUNEAU, AK	+10.7	38.3
KING SALMON, AK	+23.8	-36.1	SITKA, AK	+10.1	42.9

TABLE 3. Selected stations with temperatures averaging 20.0°F or more BELOW normal for the week.

STATION	DEPARTURE (°F)	AVERAGE (°F)	STATION	DEPARTURE (°F)	AVERAGE (°F)
KANSAS CITY/INTL., MO	-25.7	-8.5	KANSAS CITY/MUNI., MO	-21.3	13.6
VALENTINE, NE	-24.3	0.9	MOLINE, IL	-21.2	6.3
NORTH OMAHA, NE	-24.3	4.1	CEDAR RAPIDS, IA	-21.1	5.0
SIOUX CITY, IA	-24.1	0.4	RAPID CITY, SD	-21.1	5.7
OMAHA/EPPLEY, NE	-23.2	4.8	LINCOLN, NE	-21.0	6.5
TOPEKA, KS	-23.1	9.6	SIOUX FALLS, SD	-21.0	-0.1
MINOT, ND	-23.0	-7.3	MASSENA, NY	-21.0	-0.2
NORFOLK, NE	-22.6	2.3	COLUMBIA, MO	-21.0	12.9
WARROAD, MN	-22.5	-11.9	DES MOINES, IA	-20.9	5.9
BISMARCK, ND	-22.3	-5.6	SPENCER, IA	-20.5	0.4
OTTUMWA, IA	-22.2	5.7	DICKINSON, ND	-20.5	-0.8
PEORIA, IL	-22.1	6.7	SPRINGFIELD, IL	-20.4	11.2
BURLINGTON, IA	-22.0	6.8	ROLLA, MO	-20.4	14.8
QUINCY, IL	-21.8	8.9	CONCORDIA, KS	-20.3	11.7
DECATUR, IL	-21.6	10.8	WATERTOWN, SD	-20.2	-3.1
PIERRE, SD	-21.5	1.3	WATERLOO, IA	-20.0	3.1
HURON, SD	-21.4	-1.2			

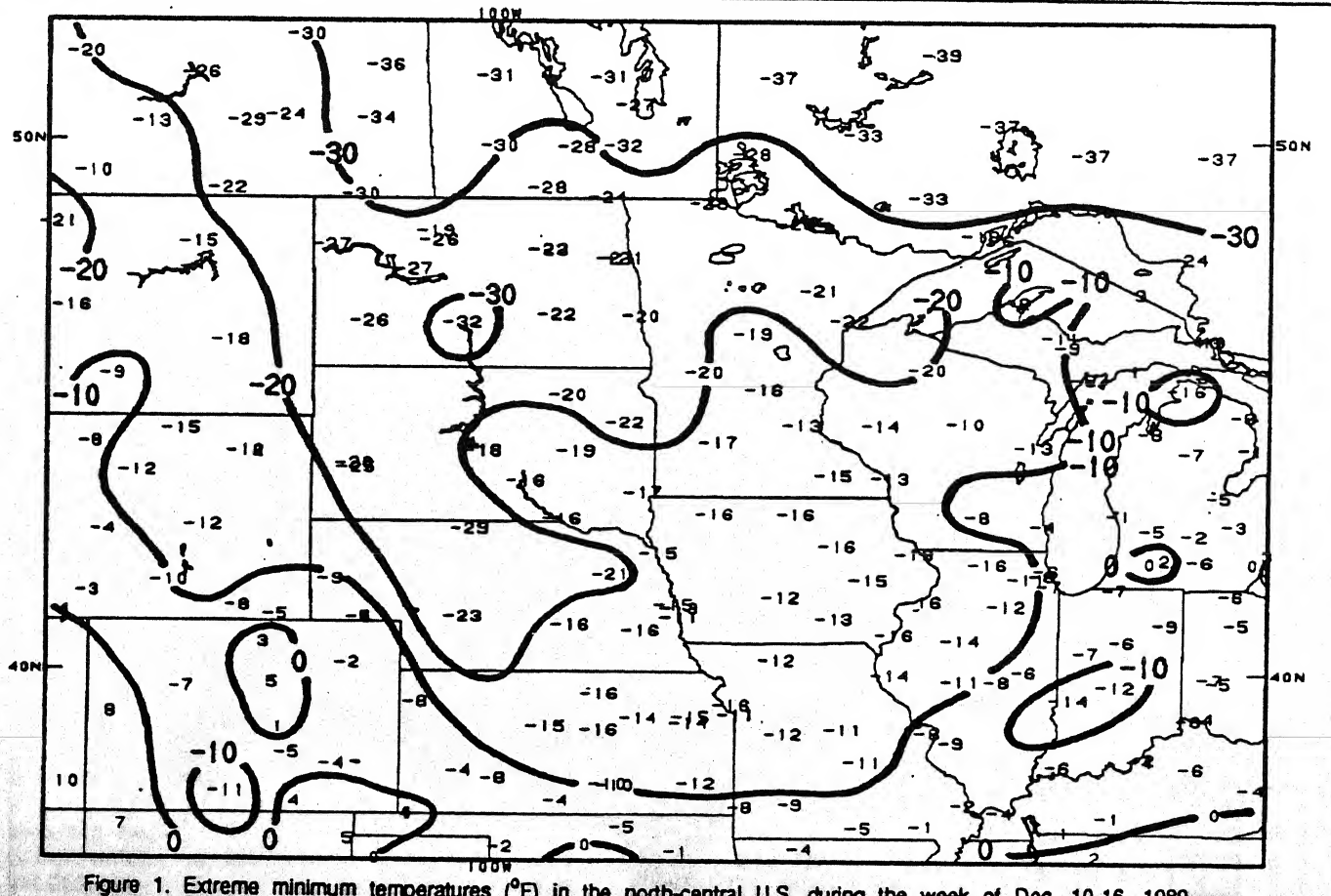
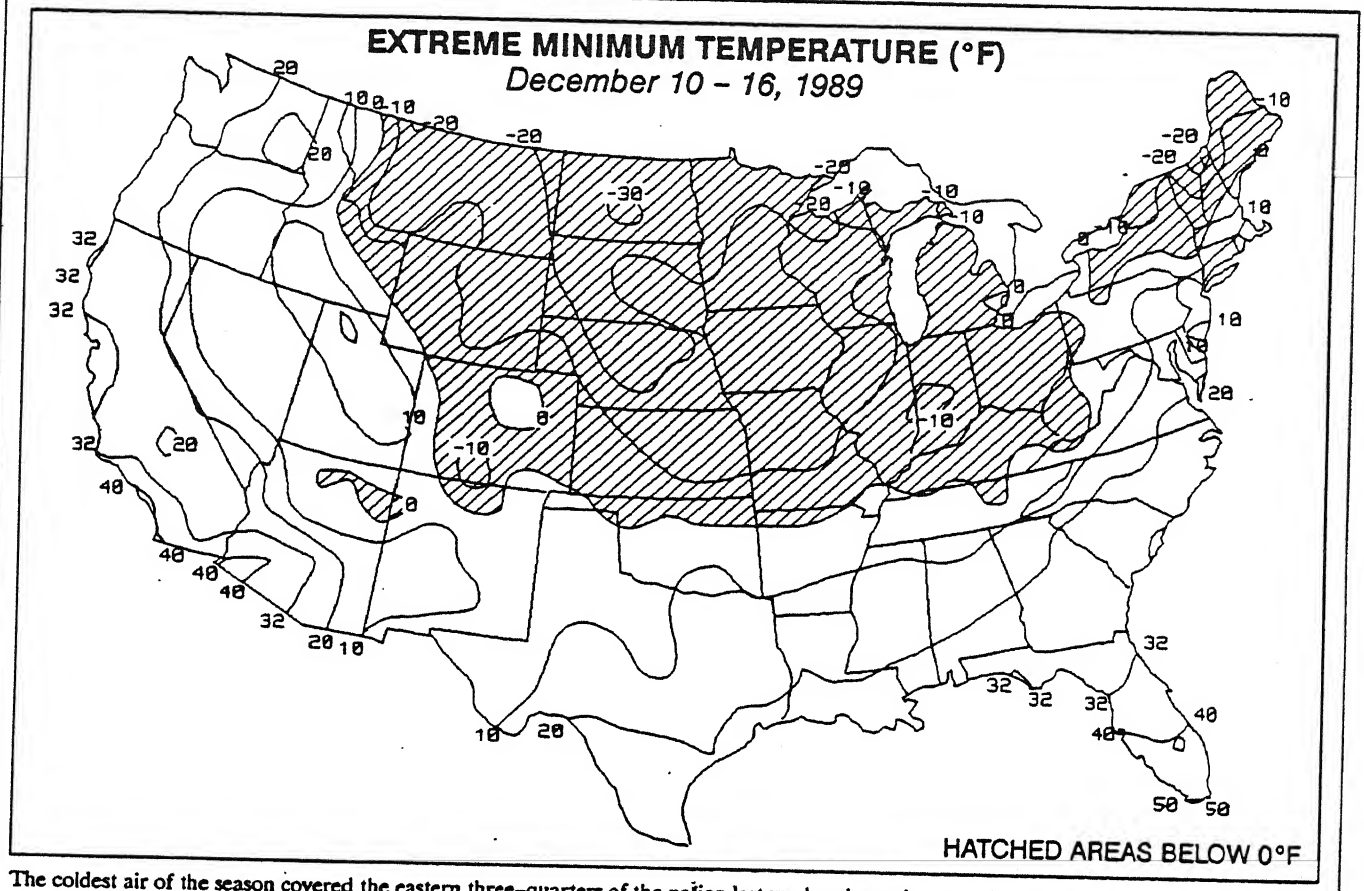
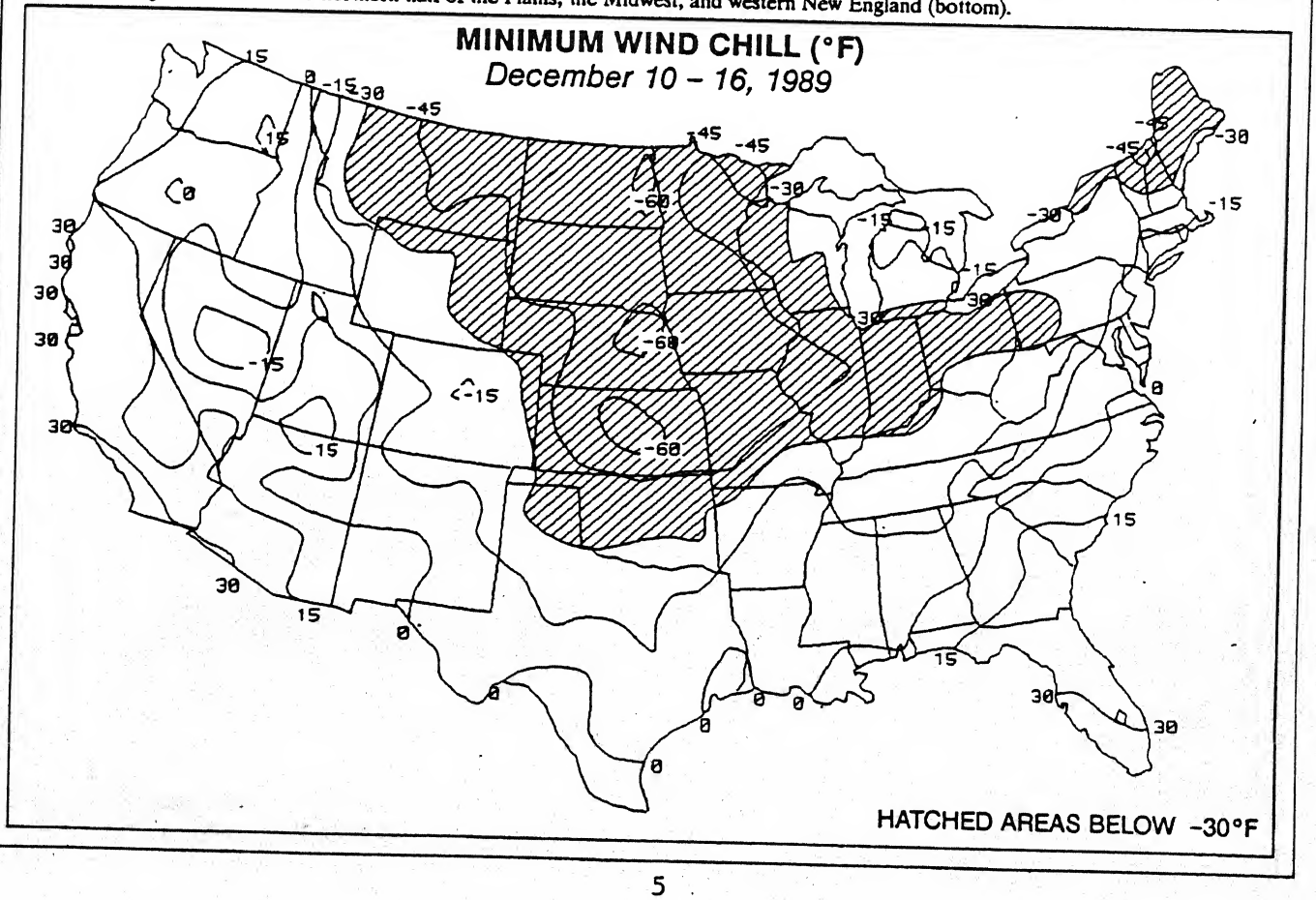
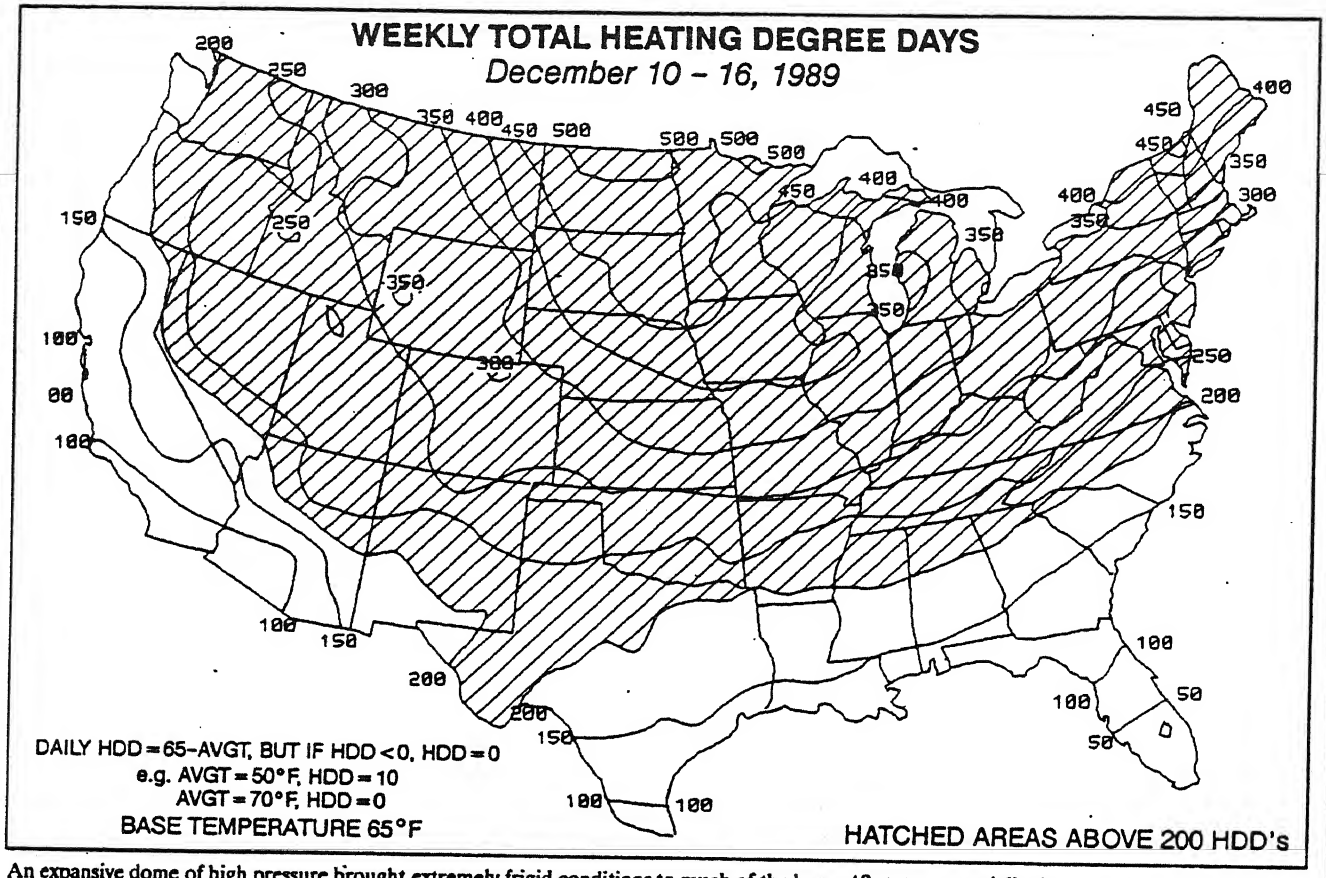


Figure 1. Extreme minimum temperatures (°F) in the north-central U.S. during the week of Dec. 10-16, 1989. Isotherms are only drawn for every 10°F starting at 0°F. Use this figure with the front cover for a comparison of extreme minimum temperatures AND wind chills (°F) for last week. Subzero lows covered the entire northern and central Plains, Midwest, and Great Lakes, and readings under -20°F were recorded across the northern Great Plains and upper Midwest.

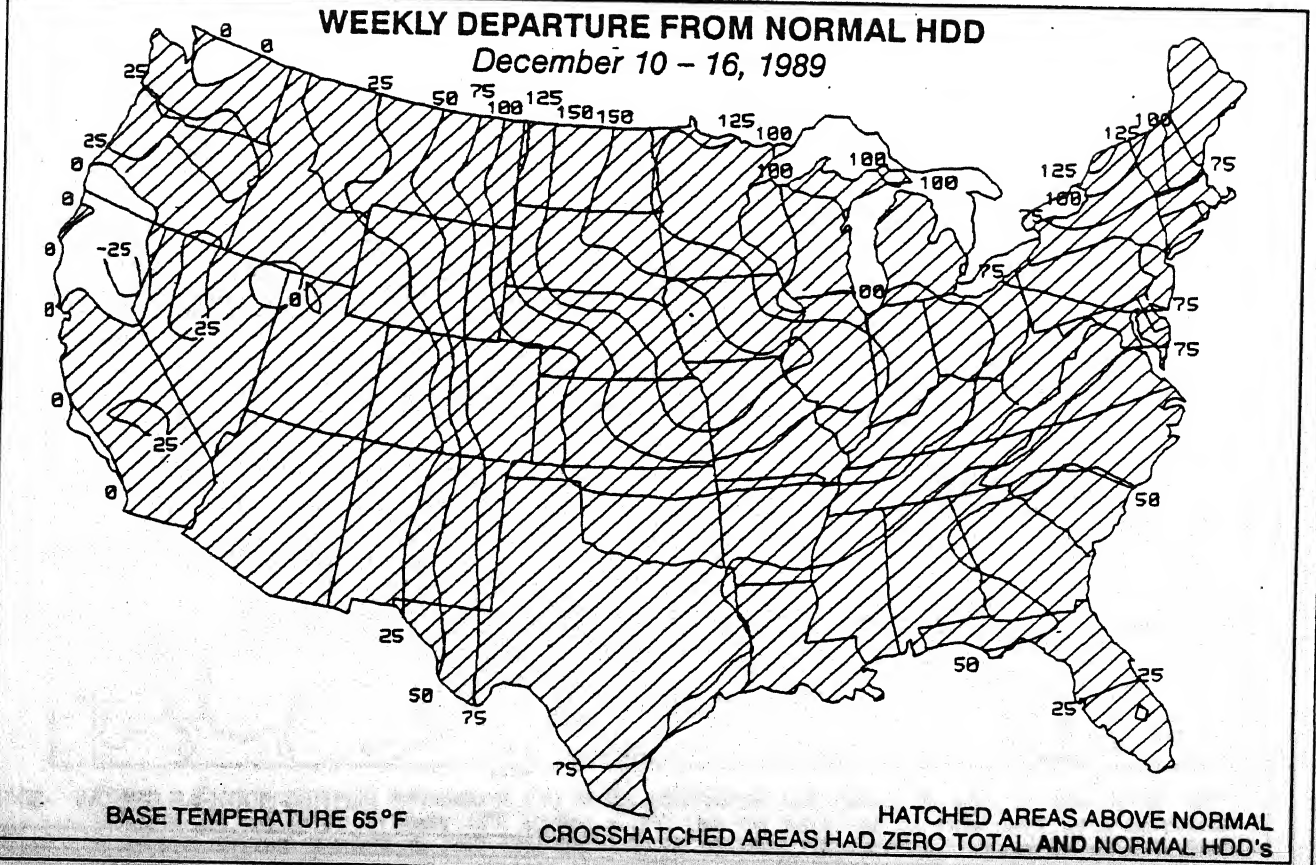


The coldest air of the season covered the eastern three–quarters of the nation last week as lows plummeted well below 0°F in the northern and central Plains, Midwest, Great Lakes, and New England while freezing temperatures extended southward into north–central Florida and far into northern Mexico (top). Strong northwesterly winds accompanied the low temperatures, producing extremely dangerous wind chills (less than –30°F) throughout much of the northern half of the Plains, the Midwest, and western New England (bottom).



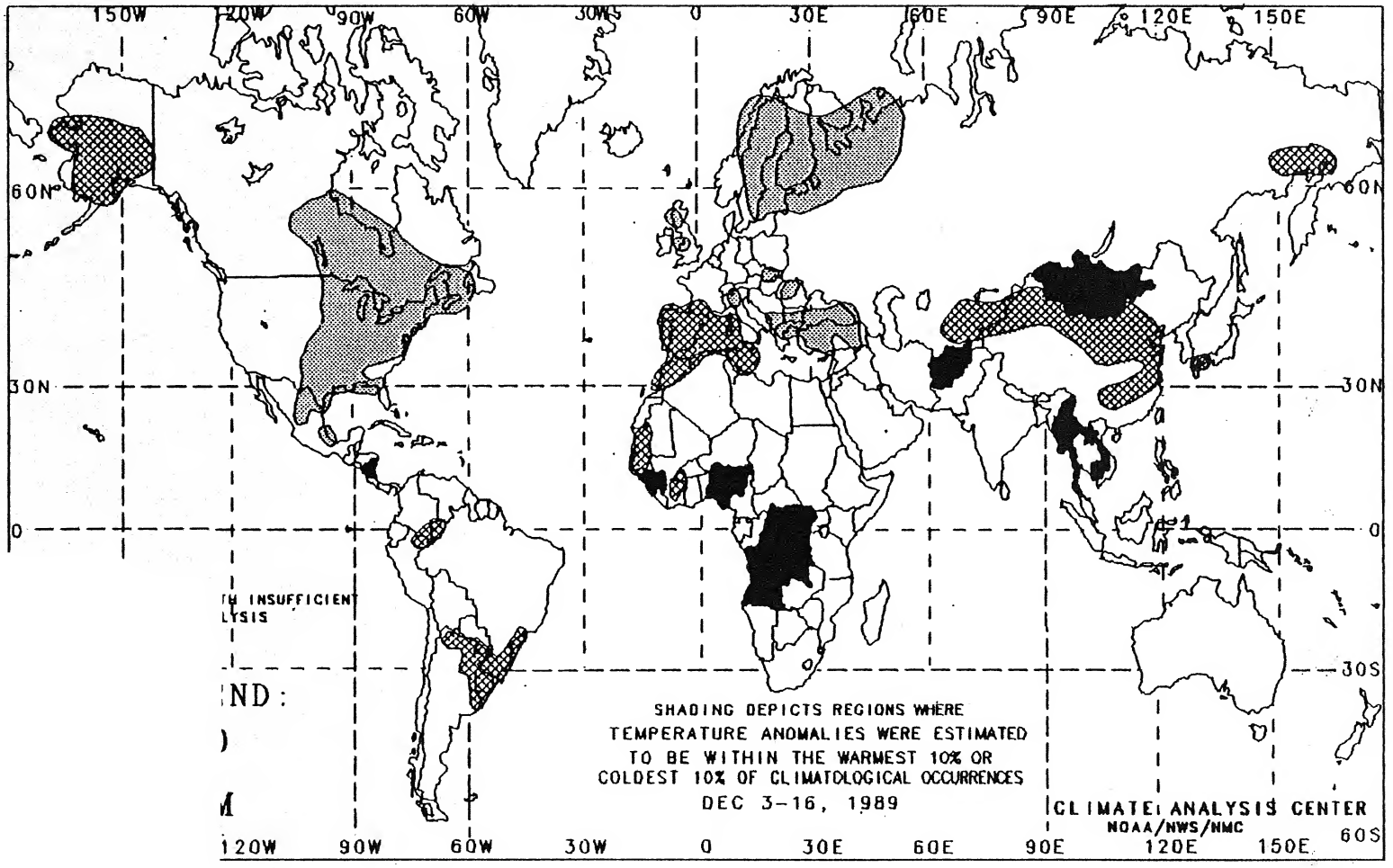


An expansive dome of high pressure brought extremely frigid conditions to much of the lower 48 states, especially the northern half of the Great Plains, upper Midwest, and western New England, as weekly temperature departures ranged between −15°F and −25°F and heating usage surpassed 400 HDD's (top). All of the contiguous U.S., except for a few areas of the Far West, experienced above normal heating demand. The greatest departures (more than +150 HDD's) were located in the lower and middle Missouri Valley (bottom).



GLOBAL TEMPERATURE ANOMALIES

2 WEEKS



are based on approximately 2500 observing stations
perature observations were received from synoptic
erate on a twenty-four hour basis so many night
n. As a result of these missing observations the
e may have a warm bias. This in turn may have
the extent of some warm anomalies.

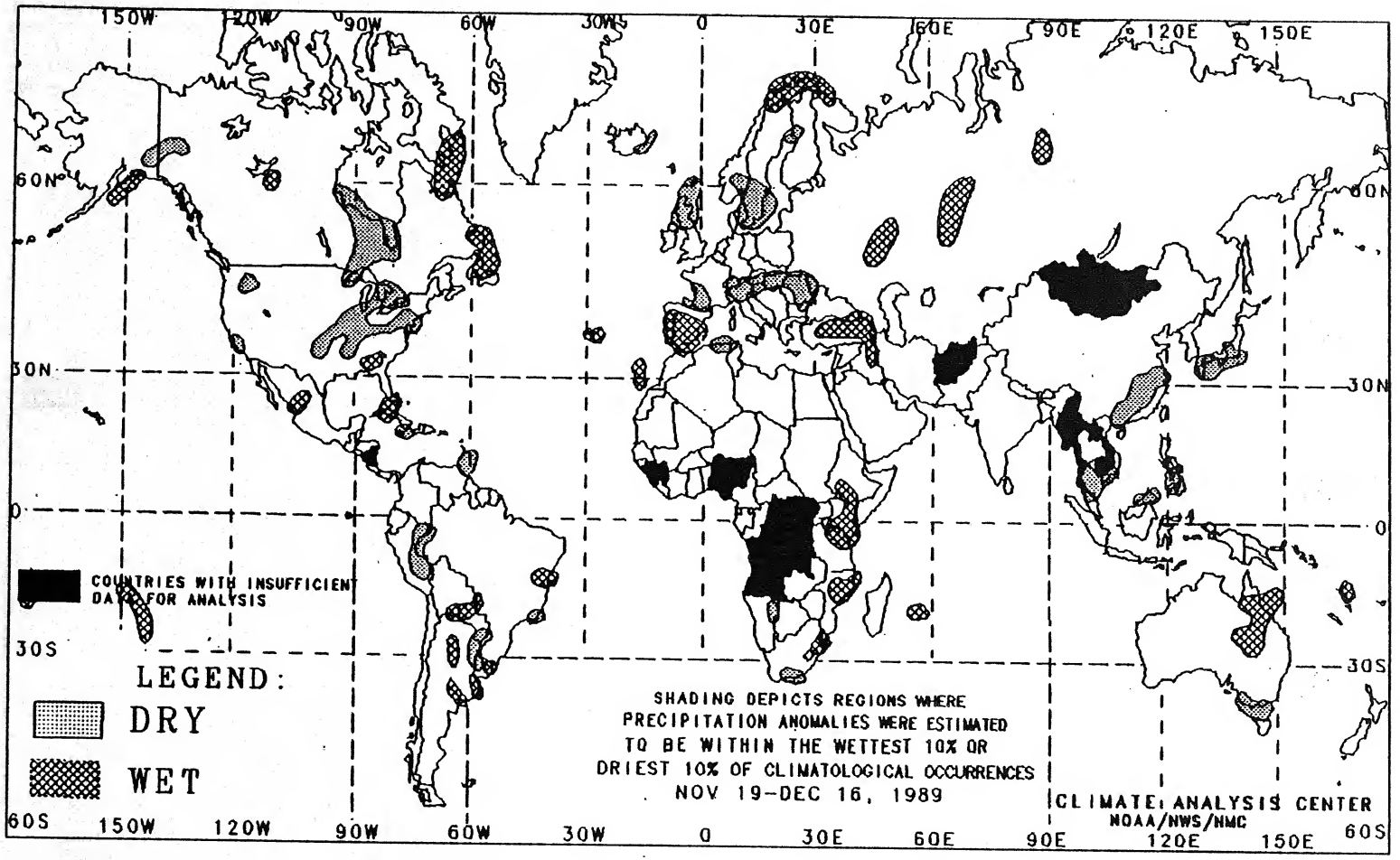
not depicted unless the magnitude of temperature
.5°C.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

This chart shows general areas of two week temperature anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

GLOBAL PRECIPITATION ANOMALIES

4 WEEKS



The anomalies on this chart are based on approximately 2500 observing stations for which at least 27 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

In climatologically arid regions where normal precipitation for the four week period is less than 20 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total four week precipitation exceeds 50 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of four week precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

SPECIAL CLIMATE SUMMARY

CLIMATE ANALYSIS CENTER, NWS, NMC
NATIONAL WEATHER SERVICE, NOAA, DOC

MOST SOUTHERN AFRICAN LOCATIONS HAVE EXPERIENCED A WET START TO THE 1989–1990 RAINY SEASON

During the late spring, summer, and early autumn months (approximately October–March), most of southern Africa normally receives the bulk of their annual precipitation. Locally, the northern and eastern sections of South Africa, southern Botswana, southeastern Zimbabwe, and much of Mozambique usually record 75–90% of their annual rainfall during this six–month period (Figure 1). In northern Botswana and Mozambique, and across most of Zimbabwe, Zambia, and Angola, nearly all of the annual rainfall normally occurs from October–March. In contrast, areas with a winter precipitation maximum include southwestern South Africa and the southern coast of Namibia. Normal precipitation totals for this 6–month period generally increase from west to east and from south to north (Figure 2).

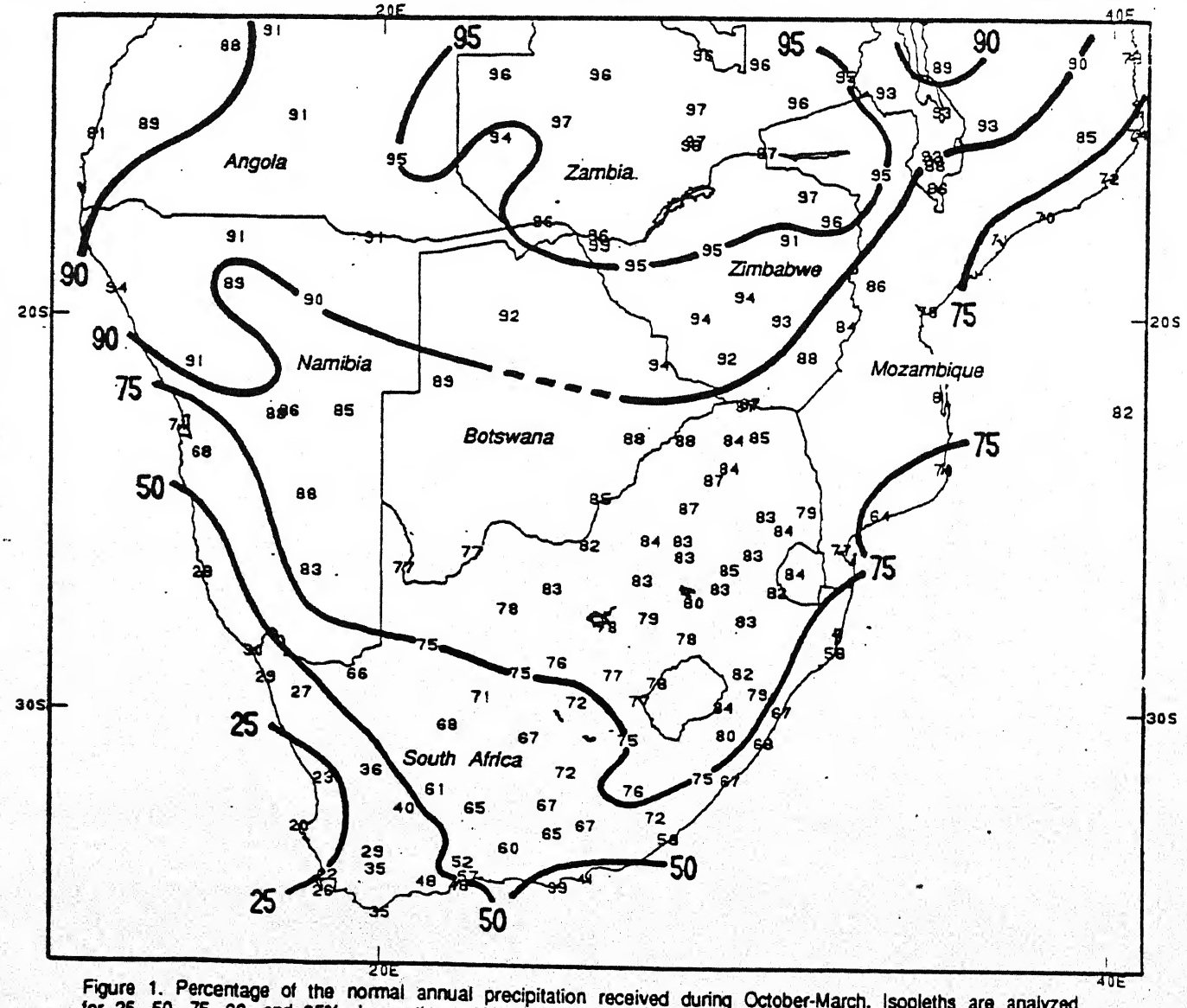


Figure 1. Percentage of the normal annual precipitation received during October-March. Isopleths are analyzed for 25, 50, 75, 90, and 95%. In southern Africa, most locations usually receive more than 75% of their annual precipitation during the late spring, summer, and early autumn months. Some areas, such as northern Zimbabwe and most of Zambia, normally observe nearly all of their annual rainfall during this 6-month period.

Last year, the rainy season's precipitation was generally near to above normal and evenly distributed with respect to time across much of South Africa, Namibia, Botswana, and northern Zimbabwe (see Weekly Climate Bulletin #89/12 dated March 25, 1989, pages 11–12). The exceptions to this included abnormally dry weather in parts of southern Zimbabwe and northern Transvaal; however, late–season February rains greatly improved moisture conditions in those areas.

Since October 1, 1989, much of this region has once again gotten off to a good start as surplus rains have fallen on most of southern and eastern South Africa, eastern Botswana, southern Zimbabwe, and in much of Mozambique (Figure 3). Eleven–week totals have surpassed 200 mm in most of southern and eastern South Africa, southern Zimbabwe, and throughout Mozambique and northern Zambia, while torrential rains (in excess of 400 mm) have soaked the southeastern coast of South Africa (Figure 4). Many stations in the latter area have measured between 100 mm and 430 mm of excess rainfall through December 16.

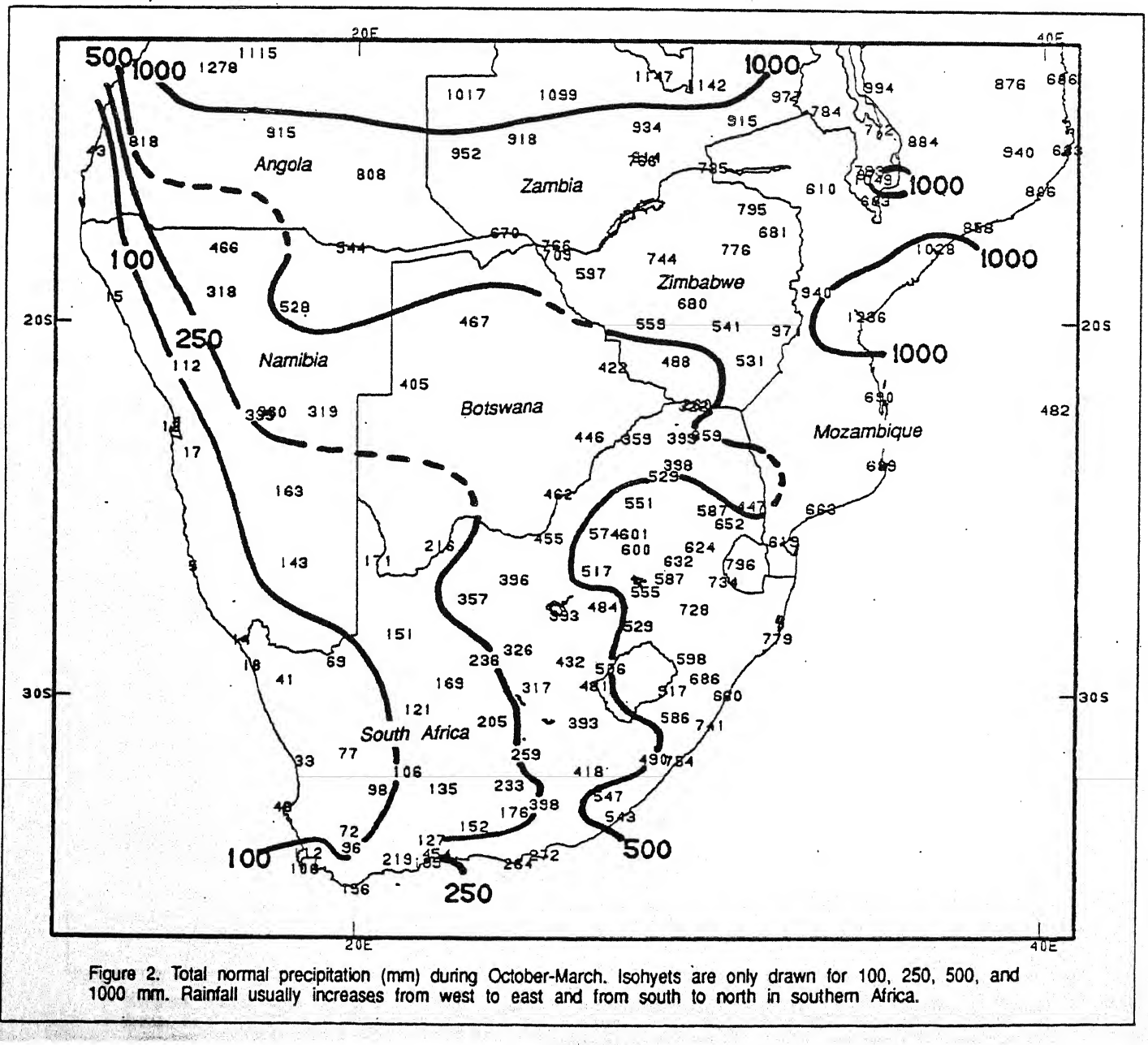


Figure 2. Total normal precipitation (mm) during October-March. Isohyets are only drawn for 100, 250, 500, and 1000 mm. Rainfall usually increases from west to east and from south to north in southern Africa.

In contrast, precipitation has been sparse in the normally drier sections of western Botswana, northwestern South Africa, and throughout Namibia. In northern Zimbabwe, however, only 60–75% of the usual rainfall has been observed while deficits of 50–75 mm have accumulated since October 1. Reports from the country mentioned that rainfall has been inadequate and spotty, and that moisture stress has already begun to affect crops. In Angola, where no meteorological data is currently available, the press reported that the country's southwestern provinces of Huila, Namibe, and Cunene have been hit hard by a four–month drought. The lack of rain since September has killed herds of cattle, wiped out fields of basic crops such as corn and beans, and claimed the lives of villagers wandering the provinces for food and water.

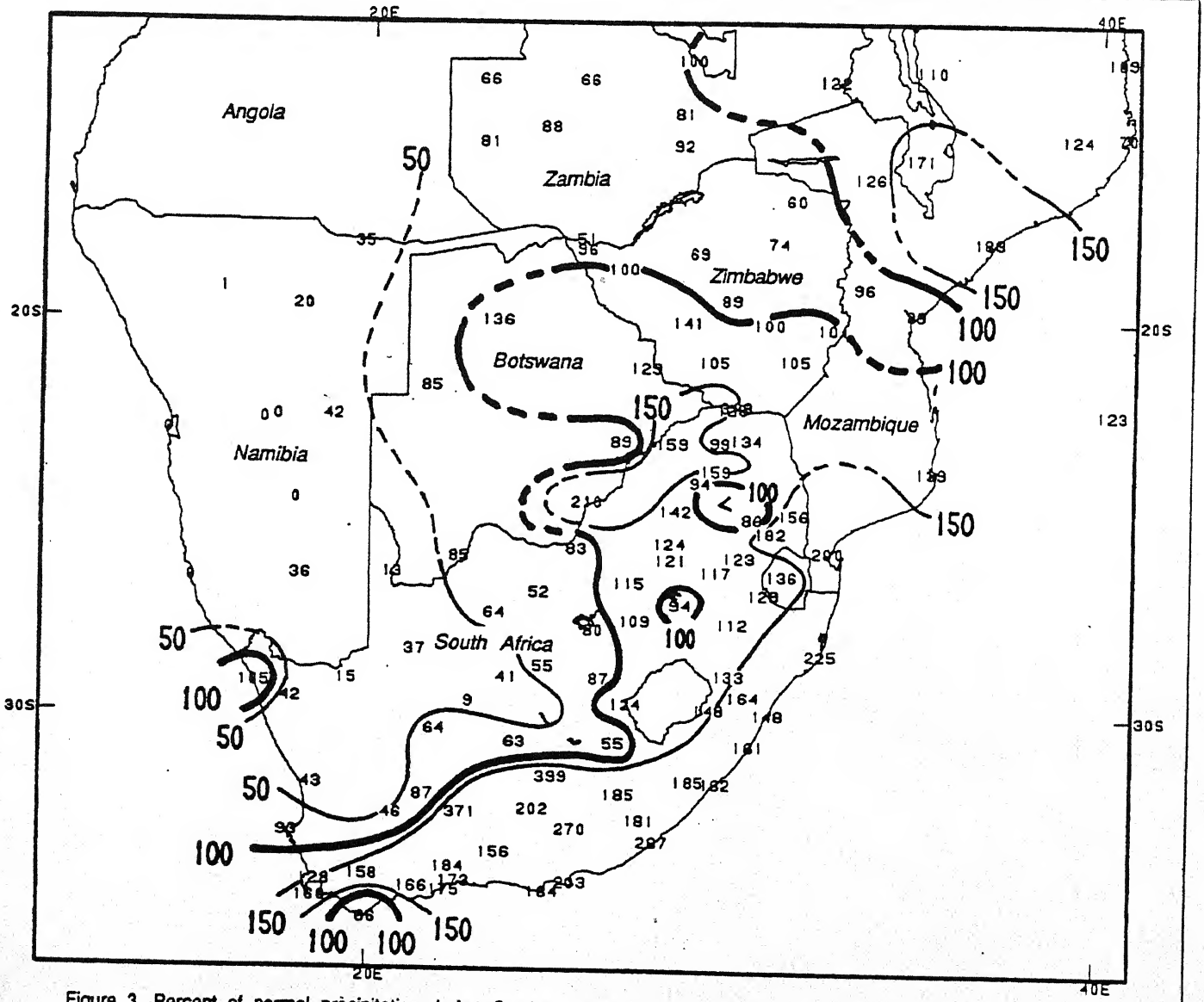


Figure 3. Percent of normal precipitation during October 1-December 16, 1989 (77 days). A station required 80% (61 days) or more of the days for inclusion, isopleths are only drawn for 50, 100, and 150%, and the thick contour represents normal (100%) precipitation. Similar to last year's rainy season, near to above normal rainfall has been observed across the southern and eastern sections of South Africa, eastern Botswana, southern Zimbabwe, and much of Mozambique. Subnormal precipitation has been recorded in northern Zimbabwe and in the normally drier parts of western Botswana, northwestern South Africa, and Namibia. According to press reports (no meteorological data available), southwestern Angola has experienced very dry conditions the past 3 months.

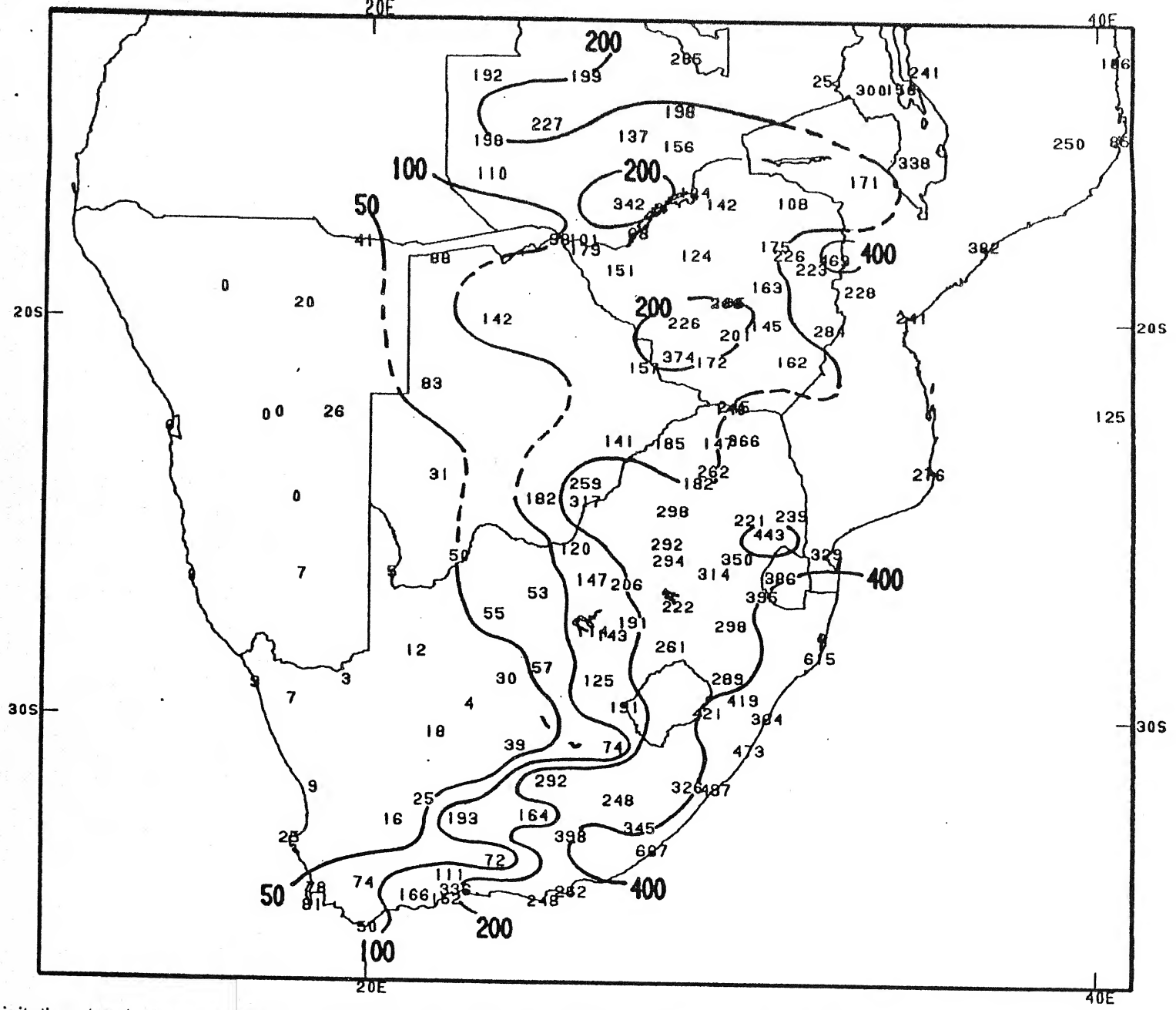


Figure 4. Total precipitation (mm) during October 1-December 16, 1989 (77 days). A station required 80% (61 days) or more of the days for inclusion, and isohyets are only analyzed for 50, 100, 200, and 400 mm. Heavy rains (more than 400 mm) have fallen along the southeastern coast of South Africa while plentiful rains (more than 200 mm) have been observed across the eastern halves of South Africa and Botswana, southern Zimbabwe, and throughout Mozambique.


Merry
Christmas